

Title (en)

TOBACCO-CONTAINING SMOKING ARTICLE

Title (de)

TABAKHALTIGER RAUCHARTIKEL

Title (fr)

ARTICLE À FUMER CONTENANT DU TABAC

Publication

EP 3831225 A1 20210609 (EN)

Application

EP 21150253 A 20071016

Priority

- US 55063406 A 20061018
- EP 17185576 A 20071016
- EP 07873916 A 20071016
- US 2007081461 W 20071016

Abstract (en)

An electrically-powered, aerosol-generating smoking article is provided, comprising an electrical power source within a tubular outer housing having a mouth-end and an end distal to the mouth-end, at least one electrical resistance heater powered by said electrical power source, a puff-actuated controller within the tubular outer housing and adapted for regulating current flow through the electrical resistance heater during draw, the controller comprising a sensor adapted for sensing draw on the smoking article by a user, and a carrier device removably engaged with the mouth-end of the tubular outer housing and comprising a cartridge providing a liquid storage container containing a mixture comprising a tobacco extract and an aerosol-forming material soaked within an absorbent fibrous material, the cartridge having a generally tubular shape and adapted for airflow therethrough, wherein the carrier device is operatively positioned such that, during draw, the mixture comprising the tobacco extract and the aerosol-forming material can be wicked into contact with the electrical resistance heater and volatilized to produce a visible mainstream aerosol incorporating tobacco components or tobacco-derived components that can be drawn into the mouth of the user of the smoking article.

IPC 8 full level

A24F 40/57 (2020.01); **A24D 1/20** (2020.01); **A24F 40/42** (2020.01); **A24F 40/10** (2020.01); **A24F 40/20** (2020.01)

CPC (source: EP US)

A24B 3/14 (2013.01 - EP US); **A24B 13/02** (2013.01 - US); **A24B 15/12** (2013.01 - US); **A24B 15/167** (2016.11 - US);
A24D 1/002 (2013.01 - EP US); **A24D 1/20** (2020.01 - EP US); **A24F 40/40** (2020.01 - EP US); **A24F 40/42** (2020.01 - EP US);
H05B 3/42 (2013.01 - US); **A24F 40/10** (2020.01 - EP US); **A24F 40/20** (2020.01 - EP US); **H05B 2203/021** (2013.01 - US)

Citation (applicant)

- EP 07873916 A 20071016
- US 5360023 A 19941101 - BLAKLEY RICHARD L [US], et al
- US 6537186 B1 20030325 - VELUZ SERGE [CH]
- WO 0237990 A2 20020516 - VECTOR TOBACCO BERMUDA LTD [US], et al
- US 2005066986 A1 20050331 - NESTOR TIMOTHY BRIAN [US], et al
- US 6874508 B2 20050405 - SHAFER KENNETH [US], et al
- US 4079742 A 19780321 - RAINER NORMAN B, et al
- US 4771795 A 19880920 - WHITE JACKIE L [US], et al
- US 4700727 A 19871020 - TORIGIAN PUZANT C [US]
- GB 1431045 A 19760407 - GALLAHER LTD
- US 3738374 A 19730612 - BENNETT H
- US 3844294 A 19741029 - WEBSTER C
- US 3878850 A 19750422 - GIBSON JAMES, et al
- US 3931824 A 19760113 - MIANO RALPH R, et al
- US 3943941 A 19760316 - BOYD DENNIS, et al
- US 4044777 A 19770830 - BOYD DENNIS, et al
- US 4233993 A 19801118 - MIANO RALPH R, et al
- US 4286604 A 19810901 - EHRETSMANN JACQUES, et al
- US 4326544 A 19820427 - HARDWICK MICHAEL J, et al
- US 4920990 A 19900501 - LAWRENCE BRIAN M [US], et al
- US 5046514 A 19910910 - BOLT ANTHONY J N [GB]
- US 5074321 A 19911224 - GENTRY JEFFERY S [US], et al
- US 5092353 A 19920303 - MONTOYA MARIA T [US], et al
- US 5778899 A 19980714 - SAITO YUTAKA [JP], et al
- US 6397852 B1 20020604 - MCADAM KEVIN GERARD [GB]
- US 6408856 B1 20020625 - MCADAM KEVIN GERARD [GB]
- US 4823817 A 19890425 - LUKE JOHN A [GB]
- US 4874000 A 19891017 - TAMOL RONALD A [US], et al
- US 4977908 A 19901218 - LUKE JOHN A [GB]
- US 5072744 A 19911217 - LUKE JOHN A [GB], et al
- US 5829453 A 19981103 - WHITE JACKIE LEE [US], et al
- US 6182670 B1 20010206 - WHITE JACKIE LEE [US], et al
- GB 2070409 A 19810909 - BRITISH AMERICAN TOBACCO CO
- US 3614956 A 19711026 - THORNTON RAYMOND ERIC
- US 4219031 A 19800826 - FULL DONALD A [US], et al
- US 6823873 B2 20041130 - NICHOLS WALTER A [US], et al
- US 5105838 A 19920421 - WHITE JACKIE L [US], et al
- WO 9816125 A1 19980423 - ROTHMANS BENSON & HEDGES [CA], et al
- US 3258015 A 19660628 - DRUMMOND ELLIS CHARLES, et al
- US 3356094 A 19671205 - DRUMMOND ELLIS CHARLES, et al
- US 3516417 A 19700623 - MOSES CLAYTON SMALL
- US 4347855 A 19820907 - LANZILLOTTI HARRY V, et al

- US 4340072 A 19820720 - BOLT ANTHONY J N, et al
- US 4391285 A 19830705 - BURNETT GEORGE H, et al
- US 4917121 A 19900417 - RIEHL TILFORD F [US], et al
- US 4924886 A 19900515 - LITZINGER ELMER F [US]
- US 5060676 A 19911029 - HEARN JOHN R [US], et al
- US 4714082 A 19871222 - BANERJEE CHANDRA K [US], et al
- US 4756318 A 19880712 - CLEARMAN JACK F [US], et al
- US 4793365 A 19881227 - SENSAABAUGH JR ANDREW J [US], et al
- US 4917128 A 19900417 - CLEARMAN JACK F [US], et al
- US 4961438 A 19901009 - KORTE STEVEN J [US]
- US 4966171 A 19901030 - SERRANO MARK A [US], et al
- US 4969476 A 19901113 - BALE CHRISTOPHER R [GB], et al
- US 4991606 A 19910212 - SERRANO MARK A [US], et al
- US 5020548 A 19910604 - FARRIER ERNEST G [US], et al
- US 5033483 A 19910723 - CLEARMAN JACK F [US], et al
- US 5040551 A 19910820 - SCHLATTER JAMES C [US], et al
- US 5050621 A 19910924 - CREIGHTON DAVID E [GB], et al
- US 5065776 A 19911119 - LAWSON JERRY W [US], et al
- US 5076296 A 19911231 - NYSTROM WILLIAM S [US], et al
- US 5076297 A 19911231 - FARRIER ERNEST G [US], et al
- US 5099861 A 19920331 - CLEARMAN JACK F [US], et al
- US 5105835 A 19920421 - DREWETT CHRISTOPHER G [GB], et al
- US 5105837 A 19920421 - BARNES RUSSELL D [US], et al
- US 5115820 A 19920526 - HAUSER BERNHARD [DE], et al
- US 5148821 A 19920922 - BEST FREDDIE W [US], et al
- US 5159940 A 19921103 - HAYWARD CHARLES R [US], et al
- US 5178167 A 19930112 - RIGGS DENNIS M [US], et al
- US 5183062 A 19930202 - CLEARMAN JACK F [US], et al
- US 5211684 A 19930518 - SHANNON MICHAEL D [US], et al
- US 5240014 A 19930831 - DEEVI SEETHARAMA C [US], et al
- US 5240016 A 19930831 - NICHOLS WALTER A [US], et al
- US 5345955 A 19940913 - CLEARMAN JACK F [US], et al
- US 5551451 A 19960903 - RIGGS DENNIS M [US], et al
- US 5595577 A 19970121 - BENSALEM AZZEDINE [US], et al
- US 5819751 A 19981013 - BARNES VERNON BRENT [US], et al
- US 6089857 A 20000718 - MATSUURA SADAYOSHI [JP], et al
- US 6095152 A 20000801 - BEVEN JOHN LAWSON [GB], et al
- US 6578584 B1 20030617 - BEVEN JOHN LAWSON [GB], et al
- US 6730832 B1 20040504 - DOMINGUEZ LUIS MAYAN [US], et al
- US 4836225 A 19890606 - SUDOH KUNIO [JP]
- US 4972855 A 19901127 - KURIYAMA KATSUMI [JP], et al
- US 5293883 A 19940315 - EDWARDS PATRICIA T [US]
- US 4848374 A 19890718 - CHARD BRIAN C [GB], et al
- US 4947874 A 19900814 - BROOKS JOHNNY L [US], et al
- US 5060671 A 19911029 - COUNTS MARY E [US], et al
- US 5146934 A 19920915 - DEEVI SEETHARAMA C [US], et al
- US 5224498 A 19930706 - DEEVI SEETHARAMA C [US], et al
- US 5285798 A 19940215 - BANERJEE CHANDRA K [US], et al
- US 5357984 A 19941025 - FARRIER ERNEST G [US], et al
- US 5593792 A 19970114 - FARRIER ERNEST G [US], et al
- US 5369723 A 19941129 - COUNTS MARY E [US], et al
- US 5692525 A 19971202 - COUNTS MARY ELLEN [US], et al
- US 5865185 A 19990202 - COLLINS ALFRED L [US], et al
- US 5878752 A 19990309 - ADAMS JOHN M [US], et al
- US 5880439 A 19990309 - DEEVI SEETHARAMA C [US], et al
- US 5915387 A 19990629 - BAGGETT JR JAMES D [US], et al
- US 5934289 A 19990810 - WATKINS MICHAEL L [US], et al
- US 6033623 A 20000307 - DEEVI SEETHARAMA C [US], et al
- US 6053176 A 20000425 - ADAMS JOHN M [US], et al
- US 6164287 A 20001226 - WHITE JACKIE LEE [US]
- US 6289898 B1 20010918 - FOURNIER JAY A [US], et al
- US 6615840 B1 20030909 - FOURNIER JAY A [US], et al
- US 2003131859 A1 20030717 - LI PING [US], et al
- US 2005016549 A1 20050127 - BANERJEE CHANDRA KUMAR [US], et al
- US 2006185687 A1 20060824 - HEARN JOHN R [US], et al
- US 4190046 A 19800226 - VIRAG ROBERT A [US]
- US 4284089 A 19810818 - RAY JON P
- US 4635651 A 19870113 - JACOBS ALLEN W [US]
- US 4735217 A 19880405 - GERTH DONALD L [US], et al
- US 4800903 A 19890131 - RAY JON P [US], et al
- US 5388574 A 19950214 - INGEBRETHSEN BRADLEY J [US]
- US 5799663 A 19980901 - GROSS JOSEPH [IE], et al
- US 6532965 B1 20030318 - ABHULIMEN MICHAEL E [US], et al
- US 6598607 B2 20030729 - ADIGA KAYYANI C [US], et al
- EP 1618803 A1 20060125 - HON LIK [CN]
- US 7117867 B2 20061010 - COX KENNETH A [US], et al
- US 6730832 B1 20040504 - DOMINGUEZ LUIS MAYAN [US], et al
- US 7025066 B2 20060411 - LAWSON JERRY WAYNE [US], et al
- US 60818198 P
- US 6895974 B2 20050524 - PEELE DAVID MCCRAY [US]
- US 19421505 A 20050801
- US 37763006 A 20060316
- US 4674519 A 19870623 - KERITSIS GUS D [US], et al

- US 4941484 A 19900717 - CLAPP WILLIAM L [US], et al
- US 4987906 A 19910129 - YOUNG HARVEY J [US], et al
- US 4972854 A 19901127 - KIERNAN BERNARD C [US], et al
- US 5099864 A 19920331 - YOUNG HARVEY J [US], et al
- US 5143097 A 19920901 - STEPHEN SOHN EDWARD J [US], et al
- US 5159942 A 19921103 - BRINKLEY PAUL A [US], et al
- US 5322076 A 19940621 - BRINKLEY PAUL A [US], et al
- US 5339838 A 19940823 - YOUNG HARVEY J [US], et al
- US 5377698 A 19950103 - LITZINGER ELMER F [US], et al
- US 5501237 A 19960326 - YOUNG HARVEY J [US], et al
- US 6216707 B1 20010417 - PAULY GILLES [FR]
- US 4821749 A 19890418 - TOFT HOWARD C [US], et al
- US 4880018 A 19891114 - GRAVES JR WILLIAM H [US], et al
- US 5551450 A 19960903 - HEMSLEY STEPHEN R [GB]
- US 5649552 A 19970722 - CHO KWANG H [US], et al
- US 6125855 A 20001003 - NEVETT ROBERT [GB], et al
- US RE32013 E 19851029
- US 3771533 A 19731113 - ARMSTRONG R, et al
- US 4577646 A 19860325 - ZIEHN KLAUS-DIETER [DE]
- US 4962773 A 19901016 - WHITE JACKIE L [US], et al
- US 5095922 A 19920317 - JOHNSON ROBERT C [US], et al
- US 5143096 A 19920901 - STEINBERG IRA [US]
- US 5172707 A 19921222 - ZAMBELLI ALESSIO [IT]
- US 5249588 A 19931005 - BROWN IAN C [GB], et al
- US 5687748 A 19971118 - CONRAD LUCAS JONES [US], et al
- US 5908032 A 19990601 - POINDEXTER DALE BOWMAN [US], et al
- US 2004182404 A1 20040923 - POINDEXTER DALE BOWMAN [US], et al
- US 4195646 A 19800401 - KITE GEORGE F [US]
- US 5873372 A 19990223 - HONEYCUTT RUFUS H [US], et al
- US 4341228 A 19820727 - KERITSIS GUS D, et al
- US 4611608 A 19860916 - VOS CORNELIS [NL], et al
- US 4706692 A 19871117 - GELLATLY GRANT [US]
- US 5724998 A 19980310 - GELLATLY GRANT [US], et al
- US 2006162733 A1 20060727 - MCGRATH THOMAS E [CH], et al
- US 4836224 A 19890606 - LAWSON JERRY W [US], et al
- US 4924888 A 19900515 - PERFETTI THOMAS A [US], et al
- US 5056537 A 19911015 - BROWN THOMAS W [US], et al
- US 5220930 A 19930622 - GENTRY JEFFERY S [US]
- US 2004255965 A1 20041223 - PERFETTI THOMAS ALBERT [US], et al
- US 2005066986 A1 20050331 - NESTOR TIMOTHY BRIAN [US], et al
- US 48933406 A 20060719
- US 3419015 A 19681231 - WALDEMAR WOCHNOWSKI
- US 4054145 A 19771018 - BERNDT WOLFGANG, et al
- US 4887619 A 19891219 - BURCHAM JR WALTER E [US], et al
- US 5022416 A 19910611 - WATSON JOHN [US]
- US 5103842 A 19920414 - STRANG JOHN C [US], et al
- US 5711320 A 19980127 - MARTIN MARIO [IT]
- US 4449541 A 19840522 - MAYS CHARLES D [US], et al
- US 4995405 A 19910226 - LETTAU K DIETER [DE]
- US 5025814 A 19910625 - RAKER MARK L [US]
- US 4893639 A 19900116 - WHITE JACKIE L [US]
- AU 276250 A
- US 2805669 A 19570910 - MIQUELY MERINO MIGUEL
- US 3316919 A 19670502 - JAMES GREEN SYDNEY, et al
- US 3398754 A 19680827 - DENIS TUGHAN VICTOR
- US 3424171 A 19690128 - ROOKER WILLIAM A
- US 3476118 A 19691104 - LUTTICH WERNER RICHARD GOTTHAR
- US 4150677 A 19790424 - BEBBS JOSEPH F JR [US], et al
- US 4131117 A 19781226 - KITE GEORGE F, et al
- US 4506682 A 19850326 - MUELLER ADAM [DE]
- US 4986286 A 19910122 - ROBERTS DONALD L [US], et al
- US 5005593 A 19910409 - FAGG BARRY S [US]
- US 5065775 A 19911119 - FAGG BARRY S [US]
- US 5060669 A 19911029 - WHITE JACKIE L [US], et al
- US 5074319 A 19911224 - WHITE JACKIE L [US], et al
- US 5099862 A 19920331 - WHITE JACKIE L [US], et al
- US 5121757 A 19920616 - WHITE JACKIE L [US], et al
- US 5131415 A 19920721 - MUÑOZ JULIO A [US], et al
- US 5230354 A 19930727 - SMITH LEIGH A B [US], et al
- US 5235992 A 19930817 - SENSAABAUGH JR ANDREW J [US]
- US 5243999 A 19930914 - SMITH LEIGH A B [US]
- US 5301694 A 19940412 - RAYMOND WYNN R [US], et al
- US 5318050 A 19940607 - GONZALEZ-PARRA ALVARO [US], et al
- US 5435325 A 19950725 - CLAPP WILLIAM L [US], et al
- US 5445169 A 19950829 - BRINKLEY PAUL A [US], et al
- US 2005016549 A1 20050127 - BANERJEE CHANDRA KUMAR [US], et al
- US 5101839 A 19920407 - JAKOB STEPHEN W [US], et al
- WO 9857556 A1 19981223 - BRITISH AMERICAN TOBACCO CO [GB], et al
- US 5105836 A 19920421 - GENTRY JEFFERY S [US], et al
- US 5203355 A 19930420 - CLEARMAN JACK F [US], et al
- US 5271419 A 19931221 - ARZONICO BARBARA W [US], et al
- US 5327917 A 19940712 - LEKWAUWA AJU N [US], et al
- US 5396911 A 19950314 - CASEY III WILLIAM J [US], et al

- US 5533530 A 19960709 - YOUNG HARVEY J [US], et al
- US 5588446 A 19961231 - CLEARMAN JACK F [US]
- US 5598868 A 19970204 - JAKOB STEPHEN W [US], et al
- US 5715844 A 19980210 - YOUNG HARVEY JAMES [US], et al
- US 4807809 A 19890228 - PRYOR JAMES W [US], et al
- US 2004173229 A1 20040909 - CROOKS EVON LLEWELLYN [US], et al
- US 4938238 A 19900703 - BARNES RUSSELL D [US], et al
- US 2005005947 A1 20050113 - HAMPL VLADIMIR [US], et al
- WO 2005039326 A2 20050506 - PHILIP MORRIS PROD [CH]
- US 6367481 B1 20020409 - NICHOLS WALTER A [US], et al
- US 6976493 B2 20051220 - CHAPMAN PAUL STUART [US], et al
- US 7047982 B2 20060523 - SEYMOUR SYDNEY KEITH [US], et al
- US 37763006 A 20060316
- US 23339905 A 20050922
- US 35191906 A 20060210
- US 46163306 A 20060801
- US 46194106 A 20060802
- "Tobacco Production, Chemistry and Technology", 1999, pages: 346
- R. J. REYNOLDS TOBACCO COMPANY MONOGRAPH, CHEMICAL AND BIOLOGICAL STUDIES ON NEW CIGARETTE PROTOTYPES THAT HEAT INSTEAD OF BURN TOBACCO, 1988
- INHALATION TOXICOLOGY, vol. 12, no. 5, 2000, pages 1 - 58
- NESTOR ET AL., BEITRAGE TABAKFORSCH. INT., vol. 20, 2003, pages 467 - 475
- STAFA ET AL., BEITRAGE TABAKFORSCH. INT., vol. 21, 2005, pages 321 - 330
- "Tobacco Encyclopedia", 1984, pages: 44 - 45
- BROWNE: "The Design of Cigarettes," 1990, pages: 43
- BOMBICK ET AL., FUND. APPL. TOXICOL., vol. 39, 1997, pages 11 - 17
- LEFFINGWELL ET AL., TOBACCO FLAVORING FOR SMOKING PRODUCTS, 1972
- "Chemical and Biological Studies on New Cigarette Prototypes that Heat Instead of Burn Tobacco", 1988, R. J. REYNOLDS TOBACCO COMPANY MONOGRAPH

Citation (search report)

- [X] EP 0845220 A1 19980603 - JAPAN TOBACCO INC [JP]
- [I] US 2005067503 A1 20050331 - KATASE MAKOTO [JP]
- [I] WO 0050111 A1 20000831 - VOGES ROBERT MARTIN [US]
- [A] WO 2006098936 A2 20060921 - RIC INVESTMENTS LLC [US]
- [E] EP 2022349 A1 20090211 - HAN LI [HK]

Designated contracting state (EPC)

AT BE BG CH CY CZ DE DK EE ES FI FR GB GR HU IE IS IT LI LT LU LV MC MT NL PL PT RO SE SI SK TR

DOCDB simple family (publication)

US 2008092912 A1 20080424; US 7726320 B2 20100601; CN 101557728 A 20091014; CN 101557728 B 20110406; CY 1122411 T1 20210127; CY 1123276 T1 20211231; DK 3398460 T3 20190722; DK 3491944 T3 20200608; EP 2083643 A1 20090805; EP 2083643 B1 20170920; EP 3260002 A1 20171227; EP 3260002 B1 20210106; EP 3266322 A1 20180110; EP 3266322 B1 20240228; EP 3345496 A1 20180711; EP 3345496 B1 20210217; EP 3398460 A1 20181107; EP 3398460 B1 20190710; EP 3398460 B8 20190821; EP 3491944 A1 20190605; EP 3491944 B1 20200527; EP 3494819 A1 20190612; EP 3508076 A1 20190710; EP 3677129 A1 20200708; EP 3831225 A1 20210609; ES 2646180 T3 20171212; ES 2735215 T3 20191217; ES 2795364 T3 20201123; ES 2862174 T3 20211007; ES 2862208 T3 20211007; HK 1248477 A1 20181019; HK 1249373 A1 20181102; HK 1258137 A1 20191108; HU E044786 T2 20191128; HU E044786 T4 20210301; HU E049177 T2 20200928; HU E049177 T4 20210301; HU E054098 T2 20210830; HU E054433 T2 20210928; JP 2010506594 A 20100304; JP 5247711 B2 20130724; LT 3398460 T 20190910; LT 3491944 T 20200625; PL 3260002 T3 20210726; PL 3345496 T3 20210927; PL 3398460 T3 20190930; PL 3491944 T3 20201005; PT 3398460 T 20190718; PT 3491944 T 20200602; SI 3398460 T1 20191030; SI 3491944 T1 20200930; TR 201910343 T4 20190722; US 10219548 B2 20190305; US 10226079 B2 20190312; US 10231488 B2 20190319; US 11641871 B2 20230509; US 11647781 B2 20230516; US 11758936 B2 20230919; US 11785978 B2 20231017; US 11805806 B2 20231107; US 11925202 B2 20240312; US 11980220 B2 20240514; US 11986009 B2 20240521; US 2010200006 A1 20100812; US 2012060853 A1 20120315; US 2015040930 A1 20150212; US 2015047656 A1 20150219; US 2017020200 A1 20170126; US 2018146713 A1 20180531; US 2018235285 A1 20180823; US 2018235286 A1 20180823; US 2019142070 A1 20190516; US 2019166916 A1 20190606; US 2019166917 A1 20190606; US 2021352954 A1 20211118; US 2022167656 A1 20220602; US 2022256907 A1 20220818; US 2023232886 A1 20230727; US 2024000129 A1 20240104; US 8079371 B2 20111220; US 8899238 B2 20141202; US 9801416 B2 20171031; US 9814268 B2 20171114; US 9901123 B2 20180227; WO 2008108889 A1 20080912

DOCDB simple family (application)

US 55063406 A 20061018; CN 200780045783 A 20071016; CY 191100745 T 20190711; CY 201100487 T 20200528; DK 18173918 T 20071016; DK 19151511 T 20071016; EP 07873916 A 20071016; EP 17185576 A 20071016; EP 17185645 A 20071016; EP 18156414 A 20071016; EP 18173918 A 20071016; EP 19151511 A 20071016; EP 19151514 A 20071016; EP 19151515 A 20071016; EP 20156212 A 20071016; EP 21150253 A 20071016; ES 07873916 T 20071016; ES 17185576 T 20071016; ES 18156414 T 20071016; ES 18173918 T 20071016; ES 19151511 T 20071016; HK 18107987 A 20180621; HK 18108254 A 20180627; HK 19100491 A 20180627; HU E17185576 A 20071016; HU E18156414 A 20071016; HU E18173918 A 20071016; HU E19151511 A 20071016; JP 2009533473 A 20071016; LT 18173918 T 20071016; LT 19151511 T 20071016; PL 17185576 T 20071016; PL 18156414 T 20071016; PL 18173918 T 20071016; PL 19151511 T 20071016; PT 18173918 T 20071016; PT 19151511 T 20071016; SI 200732117 T 20071016; SI 200732154 T 20071016; TR 201910343 T 20071016; US 2007081461 W 20071016; US 201113297983 A 20111116; US 201414525722 A 20141028; US 201414527287 A 20141029; US 201615286087 A 20161005; US 201815879268 A 20180124; US 201815961217 A 20180424; US 201815961530 A 20180424; US 201916247298 A 20190114; US 201916271426 A 20190208; US 201916271443 A 20190208; US 202117387388 A 20210728; US 202217673424 A 20220216; US 202217739903 A 20220509; US 202318129643 A 20230331; US 202318469365 A 20230918; US 76389010 A 20100420